Exhibit 1
OET STA Form
File No. 0179-EX-ST-2016
10 February 2016

Required Supplemental Information

The following additional information is provided pursuant to the Office of Engineering and Technology's Public Notice, "Guidance on Obtaining Experimental Authorizations for Commercial Space Launch Activities," DA: 13-446 (OET, released March 15, 2013):

a. Technical information including frequency, power, emission, latitude and longitude coordinates of the launch site or test operations.

See foregoing STA Form for technical parameters. For telemetry transmission, two S-band antennas are used, mounted 180° apart on a 200 inch diameter, to achieve nearly spherical coverage. Coordinates for SLC-3 launch site are: Latitude 34° 38' 24.5687" North; Longitude 120° 35' 22.3933" West. The launch pad altitude is 496.98 feet above mean sea level.

b. An overview of the proposed launch or testing including, if appropriate, identifying the launch facility and the overall mission.

See "Purpose of Operation" on Main STA Form.

c. The anticipated orbital parameters or range of orbital parameters (altitude, inclination) in which the launch vehicle or related spacecraft will operate.

The Nominal WorldView-4 Trajectory State Vector data uses the EFG Geodetic Coordinate System. The EFG Coordinate System is Right Handed, Earth Centered and Earth Fixed. Positive G corresponds to the North Polar Axis. E and F are in the Equatorial Plane with Positive E intersecting the Prime Meridian and Positive F, the 90-degree East Meridian.

d. A 24-hour contact for interference issues.

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e. If the applicant is also requesting authorization to operate an earth station to communicate with the launch vehicle or spacecraft, it should provide the frequency, power, emission, latitude and longitude coordinates for the earth station. If the applicant is planning to communicate with an earth station operated by another company, the United States government, or one located outside the United States, its territories and possessions, the applicant should include technical parameters of the earth station in an exhibit to the application for reference purposes only.

Western Range (WR) TLM ground stations, located at and down range from VAFB, the Air Force Satellite Control Network (AFSCN), and TDRSS will provide coverage throughout the flight.

Station	Geodetic Latitude (deg N)	Geodetic Longitude (deg E)	Geodetic Altitude (ft)	Antenna Gain (dB)	Noise Temperature (K)	G/T (dB/K)
VAFB & Vicinity						
COOK	34.8	239.5	879	46.8		25.5
TRS	34.6	239.5	2016	46.8		17.5
AFSCN						
LION	51.12	359.09	469	46.8		25.5
POGO	76.52	291.40	485	46.8		25.5
HULA	21.56	201.76	1381	46.8		25.5
TDRSS						
TDRS 041 (F12)[1]	±6.56	41.31	117409829.5			9.5 – 12.3
TDRS 171 (F11)[1]	±6.12	171.05	117409538.4			9.5 – 12.3

(1) TDRS operates in a daily “figure 8” pattern. Location values (latitude/east longitude/altitude) are taken from the average over the 18 month ephemeris with the exception of latitude which is the average min/max of the latitudes observed over the 18 month ephemeris. The space-to-space link G/T varies with the amount of earth albedo, and is calculated in the link margin program (from GFSC CLASS Analysis)

Exhibit 2
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Supplemental Antenna Information and Justification for Bandwidth Exemption for Emission Designator 6M40G7D

Lockheed Martin Corporation provides the following supplemental antenna information and justification for bandwidth exemption are provided in support of the requested special temporary authority:

1. Data Acquisition and Video System (DAVIS) S-band Telemetry (TLM) System

Manufacturer P/N: T-714

The Atlas V DAVIS TLM system monitors several hundred launch vehicle parameters in addition to guidance and navigation data prior to launch and throughout all phases of flight. The telemetry downlink will utilize the two S-band Patch Antenna elements on this mission. The telemetry antennas are located on the Centaur stage.

Justification for Bandwidth Exemption for Emission designator 6M40G7D with respect to NTIA Manual § 10.8.2.A, Supplemental Information for Space Systems Using Necessary Bandwidths Greater Than 5 MHz for Transmissions from Space in the Band 2200-2290 MHz

The Atlas V vehicle RF design is based on the need to utilize both USAF and AFSCN ground assets and NASA TDRS satellite assets to support mission data requirements. TDRS requires a BPSK or QPSK modulation, and ULA utilizes the more BW efficient QPSK method for all high bandwidth phases of flight. The system utilizes a single RF downlink with both record/playback and real-time techniques to transfer mission data and video to the various stations with maximum Bandwidth efficiency and minimum airborne/ground hardware resource utilization and cost. During early flight phases (less than 15 minutes) the real-time data is essential to investigation of flight anomalies, and maximizing the amount of data acquired up to an anomaly is vital to problem resolution as recorded data is not recoverable after failure. After the early boost phase has ended and the first burn of the second stage has started with no catastrophic anomalies the risk of data loss from a record/playback technique is much lower, and also the booster data is no longer needed so the bandwidth can be greatly reduced for the remaining period of flight. The telemetered data in early flight includes mission critical Range Safety, vehicle performance, Guidance computer, dynamic environment, and video information. The data is used to provide mission assurance to the customer ICD requirements, vehicle health and status information vital for anomaly resolution and clearing the next flight which can be days later, Range Safety tracking information for public and asset protection, and inflight video for satisfying customer requirements and assistance in identification of abnormal events or excess debris liberation.

The reason an alternative modulation technique (more bandwidth efficient, such as 8PSK) is not utilized for this single link is that the receiving assets do not support more efficient techniques currently, TDRS is only compatible with BPSK or QPSK modulation, not PCM/FM so even though these could be more efficient for ground stations they would not work later in flight for TDRS.

2. GPS Metric Tracking (MT) S-Band TLM System

Manufacturer P/N: TTS-3000-5W-BPSK

The GPS Metric Tracking System is used to determine the real time position and velocity of the Atlas V launch vehicle. The GPS S-Band downlink will utilize the two Tri-Band Antennas on this mission. The Tri-Band antennas are located on the Centaur stage.